ENTOMOLOGICAL NEWS

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CONTENTS

Imms—Cooperative measures for locust control 169

Kenaga—Notes on Hadronotus parkeri 173

Caldwell—Notes on Oecleus 174

White—A new Scelolyperus and key to N.A. species 177

Froeschner—Notes and keys to Missouri Dermaptera 181

Hayes—Bibliography of keys to immature mosquitoes 183

Notes and News in Entomology 190

Current Entomological Literature 193

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ENTOMOLOGICAL NEWS

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Co-operative Measures for Locust Control

By A. D. IMMS, F.R.S.

President of Britain's Royal Entomological Society; was from 1918–31 Chief Entomologist at Rothamsted Experimental Station. Is University reader in Entomology at Cambridge

Depredations by locusts have, in all probability, been a menace to the food supply of man ever since he adopted some form of agriculture. References to these insects are to be found in the writings of Pliny, in Chinese, Egyptian and Greek texts, and there are also the familiar Biblical allusions. The earliest discovered record of locusts is said to be a representation of one of these insects on the wall of an Egyptian tomb of about the date 2400 B.C.

Two main phenomena have, almost from time immemorial, obstructed the devising of sound methods for the control of locusts. One is the prevalence of outbreaks at more or less irregular and usually unpredictable intervals. The other is the frequent occurrence of outbreaks in one country, and their spread causing depredations in other and often far distant lands.

Lack of fundamental knowledge of the origins and causes of the outbreaks has been the reason for the repeated frustration of human efforts to cope with them.

It was not until 1921 that some light began to be shed on these problems. In that year B. P. Uvarov, of the (then) Imperial Bureau of Entomology in London, advanced what has now become well known as the phase-theory of locusts. Its starting point is that a locust can exist in three biological phases: a solitary one (phasis solitaria), a transitional one

(phasis transiens), and a gregarious or migratory phase (phasis gregaria).

The periodicity of locust outbreaks is connected with the transformation of these insects from the harmless solitary phase into the destructive migratory one. Subsequent experimental observations made by J. C. Faure in South Africa in 1929–31 and in Minnesota, U. S. A., in 1933, and by others elsewhere, have now so fully corroborated the main contentions of Uvarov's phase-theory that it is accepted to-day as an established biological phenomenon.

By varying the conditions, locusts can be reared experimentally from the eggs to develop into whichever of the phases is desired. If a large batch of the hoppers be reared under crowded conditions in a single cage, they then become extremely active and develop into a close approximation to the gregarious phase. Under less crowded conditions they develop into the transitional phase, while individuals reared in separate containers grow into the solitary phase.

The great activity and consequent high metabolism of the gregarious individuals lead to differences separating them from those in the relatively inactive solitary phase.

It is now known that the transformation from the solitary into the gregarious, or migratory, phase occurs in nature in certain localized areas known as *outbreak areas,* which have special conditions of climate and vegetation for each locust species. It is here that the great swarms develop. Thus, swarms of the African Migratory Locust (*Locusta migratoria migratorioides*) identified as having originated in a restricted area of the Middle Niger in the French Sudan in 1928, have been shown to be the cause of an invasion involving a great part of Africa. Some of the outbreak areas of the Desert Locust (*Schistocerca gregaria*) have been discovered among the barren scrub lands bordering the Red Sea. Swarms of the Moroccan Locust (*Dociostaurus maroccanus*) have been shown to develop on stony hillsides clothed with scanty vegetation.

Knowledge of South American Locusts is incomplete. The most important species is *Schistocerca paranensis,* not known

for certain in its solitary phase. It is possible that the North American *S. americana* is, in fact, not a separate species, but the hitherto unrecognized solitary phase of *S. paranensis* has apparently yet to be discovered.

In North America, the once dreaded Rocky Mountain Locust (*Melanoplus spretus*) is no longer evident. Various causes have been examined to account for its disappearance. The experiments of Faure, made in 1933, point to its being the now extinct gregarious phase of the very abundant *M. mexicanus* (*atlanis*), but further experiments and observations are needed.

The widespread migrations of locusts make it futile for each country affected to attempt its own isolated control measures. At the most, such measures are only temporary palliatives. Much of the failure to repress these plagues is now recognized to be the result of "isolationist policy."

A severe outbreak of the Desert Locust was the moving factor in the British Government taking steps towards solving the problem by setting up a special research organization. This British venture led to the holding of an International Locust Conference in Rome in 1930, which requested the British organization to serve as the international centre for co-ordinating locust research and the collecting of information. Other conferences followed, the fifth being held in Brussels in 1938.

World War II then intervened, and these meetings are now in abeyance, but locust investigations are being continued. Headquarters and initiatory organization is the Anti-locust Research Centre in London, which operates under the direction of Sir Guy Marshall, with Dr. B. P. Uvarov as technical head. The arranging of campaigns against locusts, and the establishment of efficient locust information services, are largely in the hands of the British Colonial Office, which works through a special committee for the purpose.

The whole organization is too complex to be detailed in a brief article, but it may be said that it requires close co-operation between many Governments and departments in order to ensure harmony and progress.

At the present time, despite the war, extensive work is going on in regard to the Desert Locust. The swarms of this insect, if unchecked, would be deleterious to the Allied war effort, owing to the destruction of food and fodder crops. These would need to be made good by imports, with consequent extra demand upon shipping.

The Middle East, India and East Africa, are menaced by the probability of outbreaks of the Desert Locust during the next two years or longer. Co-operative action by Belgian, British, Egyptian, French, Indian and South African entomologists and other workers has led to the collection of a great deal of invaluable field data. Under great difficulties, the outbreak centres of this locust are being located and kept under observation—often in very remote and inhospitable lands.

Aircraft have proved an invaluable aid in this work, enabling watch to be kept where outbreak centres have been located and any tendency to migration noted. At the same time, lands likely to be affected are warned to be ready to adopt necessary measures. The ultimate aim of all this work is that the developing swarms may be destroyed in their outbreak centres or, better still, the ecological conditions therein altered by cultivation or other measures so that they are no longer suitable for generating these swarms.

In the meantime, forewarning of the arrivals of expected migrant swarms is enabling a number of menaced lands to prepare their control procedure well in advance so that, when the locusts do arrive, poison baits and other measures are available.

Twelve years of co-operative research, carried out under the direction of the Anti-locust Research Centre, have revealed much data on the migrations of the Desert Locust. Swarms usually arrive during the summer monsoon rains in India and, in autumn, they migrate to Persia and Arabia. The latter country also becomes invaded by other swarms of the same locust which have originated in Africa. From Persia and Arabia, swarms reach the margins of Soviet Asia, Iraq, Transjordan, Palestine, Syria and Egypt. Later in the season there is further dispersal to East Africa and back to India for breeding during the next monsoon rains.

Once the complexity and range of such migrations become known, co-operation of the various countries concerned becomes essential. A further indication of the progress made through co-operative research is the fact that in the present outbreak of the Desert Locust, no country has been invaded which had not previously received due warning from the Anti-locust Research Centre.

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Notes on Hadronotus parkeri Fouts (Hymenoptera: Scelionidae)

By E. E. KENAGA, Biochemical Research Laboratory,
The Dow Chemical Company, Midland, Michigan

Hadronotus parkeri was first described as a heteropterous egg parasite by R. M. Fouts in 1920.[1] No specific identification of the parasitized eggs was made at that time.

While rearing a culture of the small milkweed bug, *Lygaeus kalmii* Stäl, in our laboratory in August, 1942, a number of parasitized eggs were noted and placed in a closed petri dish for observation. The parasites hatching from these eggs were identified as *Hadronotus parkeri* Fouts through C. F. I. Muesebeck, in charge of the Division of Insect Identification, U. S. D. A., Bureau of Entomology and Plant Quarantine, Washington, D. C.

After *H. parkeri* hatched from the eggs of *L. kalmii,* the adults were placed with eggs of the large milkweed bug, *Oncopeltes fasciatus* Dall. These also hatched and were transferred back to *L. kalmii* for a generation and then to the Mexican bean beetle, *Epilachna varivestis* Muls. No Mexican bean

[1] Fouts, R. M. (1920) Some new parasites, with remarks on the genus *Platygaster* (Hymenoptera). Proc. Ent. Soc. Wash., *22* (4) : 61–72.

beetle eggs were parasitized. All of the eggs of *L. kalmii* and *O. fasciatus* in these experiments were parasitized, indicating a possible reason for the scarcity of milkweed bugs in this area in 1942.

The life cycle of *H. parkeri* takes a period of 14–16 days in the eggs of milkweed bugs at temperatures ranging from 65°–90° F.

FIG. 1.

An interesting photograph taken of a parasitized egg of *L. kalmii* shows *H. parkeri* about one day before emergence as an adult. Details of the abdomen, ocelli and parts of the legs, antennae, etc., may be seen through the semi-transparent shell of the parasitized egg. See fig. 1.

Notes on Oecleus Stal (Homoptera: Ciciidae)

By JOHN S. CALDWELL, Circleville, Ohio

The species listed by Fowler [1] are roughly divided into two groups; those with three carinae on the mesonotum and those

[1] Biologia Centrali-Americana Homoptera, 1: 88–92, 1904.

with five. In practically all cases the intermediate carinae are very weak, the appearance of five prominent carinae being due to color contrast rather than base relief. As stated by other workers *tenellus* Fowler belong in the genus *Oeclidius*. All types are in the author's collection unless stated to the contrary in the script.

Oecleus seminiger Stal

This is one of the few species easily differentiated by color and marking. The dark brown body and basal half of the elytra are distinct. The medio-ventral process of the male pygofers is elongate-ovate and as long as the styles. One male, Veracruz, Mexico (Dampf).

Oecleus pellucens Fowler (figs. 1 & 1a)

Variable in size and marking but with constant male genitalia. Length over all 4–7 mm. Costal nerve broadened at base. The fuscous band refered to by Fowler may be either entirely absent or present in varying degrees of intensity and width. Sometimes this band is enlarged to include the entire apex of the elytra and in some examples the claval area is dark fuscous. It is probable that *centronus* Ball & Klgb.[2] belongs to this species. Specimens present from Chiapas, Guerrero, Jalisco, Michoacan, Oaxaca, Puebla, Quintana Roo, San Luis Potosi, Veracruz, and the Federal District in Mexico, and from El Salvador and Guatemala.

Oecleus dubius new species (figs. 2 & 2a)

Length 6–7 mm. Orange over all with black frons; mesonotum sometimes with central tablets darkened. Veins of elytra evenly and strongly punctate with black.

Vertex narrow, slightly produced more than in *pellucens*. Frons narrowed between the eyes; median carina prominent. Profile angular. Base of costa broadened; punctations on this surface few and not prominent.

Medio-ventral process of male pygofer more elongate than in *pellucens;* aedeagus with different spur arrangement and number.

Male *holotype,* female *allotype,* and *paratypes* from Gualan,

[2] Annals Ent. Soc. Amer., 27: 193-213, 1935.

GUATEMALA, January and February, 1905, are in the H. Osborn collection at Columbus, Ohio. This species is very close to *pellucens* Fowler and may prove to be only a variety.

Oecleus decens Stal (figs. 13 & 13a)

For all practical purposes this species is today an unknown element in our fauna. It is my belief that *decens* Fowler is not *snowi* Ball as found in Arizona although the two species are similar. I am not sure that I have interpreted the description of the male genitalia as given by Fowler; however the chrotic characters compare well with the figure in the Biologia (Pl. 10, fig. 6). Specimens from Jalisco and Morelos in Mexico (Dampf).

Oecleus apicatus new species

Length 5.5 mm. Frons dark with light median carina; clypeus testaceous. Pronotum whitish with smoky spots; mesonotum smoky with yellowish carinae. Elytra evenly browned with exception of a clear apical area. Punctations on veins scattered, black. Profile somewhat rounding. Vertex produced its apical width before the eyes; widened in apical fourth. Base of costa broadened; thickening of costa at stigmal spot long, narrow.

Female holotype from Tamazunchale, San Luis Potosi, MEXICO, 8–29–39 (DeLong).

Oecleus parallelus new species (figs. 3 & 3a)

Length 6.2 mm. Black with light carinae on face and pronotum. Mesonotum with orange carinae and large orange dash in either lateral compartment. Elytra somewhat yellowish, especially in claval area.

Vertex narrow, produced; lateral margins parallel for full length. Frons narrowed between the eyes. Profile right-angled. Elytra broad; base of costa broadened. Punctations on veins not prominent. Medio-ventral process of male pygofers broadly quadrate basad, greatly produced apically.

Male holotype from Tehuacan, Puebla, MEXICO, 10–17–41 (DeLong, Good, Caldwell, and Plummer).

(*To be continued*)

A New Scelolyperus and a Key to the American Species North of Mexico (Coleoptera: Chrysomelidae)

By Burdette E. White, Merced, California

The genus *Scelolyperus* Crotch appears to have received very little attention since Dr. Horn presented his description of *cyanellus* in 1895. The new species presented herein thus bridges a gap of 50 years of systematic inactivity for this genus; and, although Horn's excellent key and review of the genus leave little to be desired, a brief modification of the half-century-old tables to include his *cyanellus* and the new form seems worthwhile.

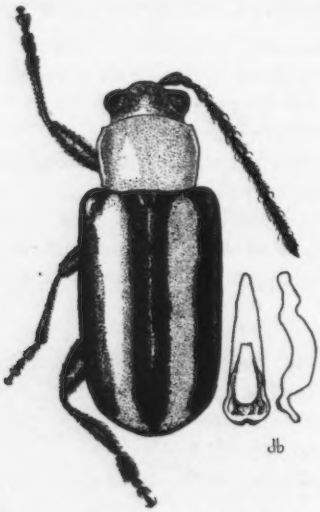
Key to the Species of *Scelolyperus* (Modified from Horn)

1. Elytra unicolorous 2
   Elytra vittate (each elytron with a broad, median, flavous vitta and the margins piceous) .....*blakeae*, n. sp.
2. Pronotum entirely yellow 3
   Pronotum either maculate or blue, varying to black 6
3. Head and femora yellow .....*flaviceps* Horn
   Head metallic green 4
4. Posterior tibiae of male straight and not toothed; elytra finely, sparsely punctate, smoother at apex *flavicollis* Lec.
   Posterior tibiae of male arcuate 5
5. Elytra coarsely, sparsely punctate; posterior tibiae of male stout and toothed at base .....*tejonicus* Crotch
   Elytra sparsely punctate and alutaceous; posterior tibiae of male strongly curved, not toothed .....*loripes* Horn
6. Pronotum yellowish, with a median and lateral spot piceous *maculicollis* Lec.
   Pronotum uniformly blue, greenish, or black 7
7. Elytra evidently punctate 8
   Elytra alutaceous, not punctate 11
8. Pronotum polished, impunctate, black 9
   Pronotum sparsely punctate, green, blue, or bronze 10

9. Size relatively small, 3–4 mm. .....*cyanellus* Horn
   Size relatively large, 6–7 mm. .....*maculicollis* (variety)
10. Posterior tibiae of male straight; antennae and legs black
   graptoderoides Crotch
   Poterior tibiae of male curved; antennae at base, anterior femora, and tibiae in great part yellow ...*schwarzi* Horn
11. Antennae filiform, last segment scarcely longer than the preceding .....*longulus* Lec.
   Antennae broader externally, the outer segments flattened and slightly concave beneath in male, last segment notably longer than the preceding .....*decipiens* Horn

Scelolyperus blakeae new species

Upper surface strongly shining, pronotum flavous to fulvous, elytra piceous and each with a broad, median flavous vitta.



Head polished, not punctate, pale, darker above each eye and on the epicranium, frontal tubercles prominent, interocular space nearly twice the vertical width of the eye; clypeus and labrum

with a few moderately long, pale setae; antennae reaching past middle of elytra, fuscous, basal segments less dark. Pronotum only slightly convex, two-thirds as long as wide, widest at apical third, surface polished, very finely, sparsely punctate, color flavous to rufous. Scutellum dark. Elytra a little more than one and one-third times as wide as pronotum, humeri prominent; surface polished, very finely punctate (apparently impunctate); color piceous with a broad, median, flavous vitta extending from base to apex; the piceous areas with a greenish reflection in strong light; the flavous areas with a micro-granular appearance due to a fine but strong subcuticular, alutaceous structure; a few fine setae along the lateral and apical margins. Body beneath polished, pale, darker on episternal sclerites, sparsely covered with pale pubescence, more densely so at sides; legs fuscous, lighter at base; tibiae of male slightly arcuate and without spurs, female with tibial spurs; basal segment of hind tarsus of male greatly delated, concave beneath, almost as long as the other tarsal segments together. Length, 3–4.5 mm.

Holotype, male, collected by author from a very thorny species of Rhamnaceae (*Condalia spathulata* A. Gray, determined by S. F. Blake, U. S. D. A.) at Big Bend State Park, Chisos Mts., Brewster County, TEXAS, July 12 to 16, 1941; and *allotype,* female, with same data, are deposited in the author's collection. Male plesiotype and 78 paratypes (39 of each sex) with same data are deposited as follows: Two pairs in the U. S. National Museum through Mrs. Doris H. Blake, one pair each in the collections of Dr. W. J. Brown, Prof. J. N. Knull, Mr. C. A. Frost, Mr. C. D. Orchard, Mr. Borys Malkin, Capt. John J. duBois, The Academy of Sciences at San Francisco, The American Museum of Natural History through Dr. Mont Cazier, The British Museum, and Lt. William Barr. The remaining specimens are in the author's collection.

In addition to the above designated paratypes, several topotypical specimens are in the collections of Captain duBois and Lt. Barr, who were present at the time of the original collection. Since these men are now in the armed services, their materials are not available for study and, unfortunately, cannot be included in the type series.

It is quite unnecessary to compare *blakeae* with any of our other *Scelolyperus* for its vittate elytra will immediately separate it from all others. However, it might easily be confused with the vittate *Luperodes* with which it bears strong superficial resemblances. From the latter, it will be readily separated by its greatly dilated basal tarsal segment on the posterior leg of the male (see figure).

The sexes are dimorphic as usual in *Scelolyperus*. But, in addition to the usual differences between the sexes, such as the elytra more explanate in the female, tibiae slightly arcuate in the male, antennae more elongate and filiform in male, and the different apical structure of the last ventral abdominal segment, there is apparently a color relationship. The females have a distinctly wider flavous vitta than the males. As a result of this feature, the females present quite a different facies to that of the male; and, in the extreme, they may have the dark margins almost absent. The male typically possesses flavous vittae equal in width to the piceous margins.

At the time of discovery there were actually millions of the beetles available. A single blow on the host plant would completely cover the beating sheet and fill the air about the plant. From this it might seem unfortunate that such a limited number of specimens was obtained; however, unless this species proves the exception to the general experiences the writer has known with this type of beetle, it will be abundantly available for future collectors at its type locality.

The new species is named after Mrs. Doris H. Blake in recognition of her excellent work on the Chrysomelidae and her assistance with this particular problem. Mrs. Blake also prepared the accompanying drawing. In addition to Mrs. Blake's able assistance the writer received valuable aid from the other half of the Blake family—Mr. S. F. Blake, and from Dr. E. Gorton Linsley whose esteemed advice in this little problem as well as on many past occasions has been truly appreciated.

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Annotations and Keys for the Dermaptera of Missouri

By Richard C. Froeschner, St. Louis, Missouri

In Missouri the Dermaptera, like most other orders, has been neglected taxonomically. As yet, our card catalogue of Missouri insects contains no literature records of earwigs. A survey of the distribution of the members of this order indicates that three species should occur here. Our cabinet records include all of them.

Keys to Missouri Families, Genera and Species of Dermaptera

1. Tarsal segment II cylindrical.....Labiidae
   Tarsal segment II bilobed.....Forficulidae

Labiidae

1. Head with postocular space shorter than length of an eye; antennal segment VI much shorter than I; length more than 8 mm.....I. *Vostox*
   Head with postocular space as long as or longer than the length of an eye; antennal segment VI but slightly shorter than I; length less than 7 mm.....II. *Labia*

I. *Vostox* Burr

1. Head, pronotum and tegmina almost black, shining; exposed portion of wings yellow, with inner and apical margins black; abdomen, forceps and under surface chestnut-brown; forceps stout, incurved at apex; length of body 8.5–9.5 mm.....1. *brunneipennis* (Serv.)

II. *Labia* Leach

1. Tegmina twice as long as pronotum, the latter subquadrate, narrower than head; legs uniformly yellow-brown; length of body 3–4 mm.....2. *minor* (Linn.)

Forficulidae

1. Antennae 12-segmented, with segment IV twice as long as broad and subequal to III.....III. *Doru*

III. *Doru* Burr

1. Chestnut-brown with palpi, legs, edges of pronotum and outer two-thirds of tegmina yellow. Pronotum longer than broad, narrower than head and about half the length of tegmina; length of body 8–11 mm. 3. *aculeatum* (Scud.)

Annotated List of Species

1. *Vostox brunneipennis* (Serv.). [Fig. 1.] Usually considered rare, this species is apparently common when found. The two times we have collected it in Missouri

Fig. 1.

we found it in great numbers under loose bark. Adults and nymphs were taken from a tree in a moist ravine near Lampe (Stone Co.) on September 25. At Qulin (Butler Co.), on February 22, adults were taken from a log that was partially submerged in a swamp.

2. *Labia minor* (Linn.). This species, which was originally introduced from Europe, seems to be the commonest member of the order in the state. It is to be found under boards, rocks and logs on the ground and at night is frequently taken at lights. Although our records extend from April

4 to October 3, adults will probably be found to occur the year around. Boone, Butler, Cape Girardeau (C. W. Wingo), Dunklin, Iron, Jefferson (E. P. Meiners), and St. Louis counties.

3. *Doru aculeatum* (Scudd.). A single specimen was found on a porch in St. Louis on March 4. One other from St. Louis is in the collection of Dr. E. P. Meiners. He took it on April 11 from a head of cabbage which was purchased at a local market. It will probably be found throughout most of the state as it has been recorded as occurring north to Michigan and west to Nebraska.

A Bibliography of Keys to Immature Mosquitoes (Diptera: Culicidae)

By Wm. P. Hayes

(*Continued from page 145*)

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Notes and News in Entomology

Under this heading we present from time to time short reviews, notes, news, and comments on entomology throughout the world. Contributions from readers are solicited and will be acknowledged when used.

Since the relatively recent electron microscope study of the architecture of iridescent butterfly scales was published in a non-biological journal [1] I am taking the liberty of abstracting a part of that paper here. It has long been recognized that insects possess both pigment colors and structural colors, and, further, that the brilliant iridescent colors are due to minute structural elements similar to the lines of a grating or the lamellae of a soap bubble which produce colors by interference effects. By detailed inspection of the light scattering, Süffert [2] and Mason [3] were able to infer what types of structures must be present to give rise to the effects observed, although these details were too small to be seen with the light microscope. With the greater resolving power of the electron microscope it is possible to observe these structures directly, and a fairly detailed analysis has been presented for one case—the wing scales of the brilliant blue butterfly, *Morpho cypris*.[4]

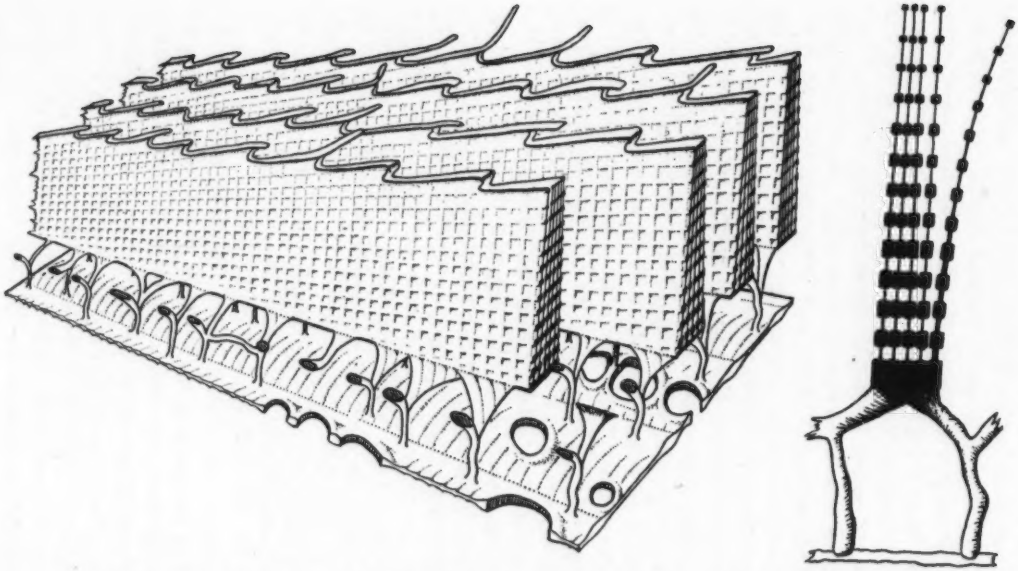
The accompanying figure shows a schematic and somewhat idealized fragment of such a scale as reconstructed from numerous stereoscopic electron micrographs. On the left is a

[1] T. F. Anderson and A. G. Richards, Jr. An electron microscope study of some structural colors of insects. Jour. Applied Physics, 13: 748–758. Dec. 1942. See this for halftone figures and detailed technical analysis.

[2] Zts. Morph. u. Ökol. Tiere, 1: 171–308. 7 pls. 1924.

[3] Jour. Physical Chem., 27: 201–248, 401–447, 1923; 30: 383–395, 1926; 31: 321–354, 1856–1872, 1927; Entomological News, 40: 52–56, 1929.

[4] The indirect optical studies of Süffert and Mason show that this "Morpho-type" of physical coloration does not hold for the physical colors of *all* types of butterfly scales. The same general structural elements are to be found in the wing scales of mosquitoes. A poor reproduction of part of a mosquito scale has been published but it was at the time unfortunately misidentified as a piece of egg shell (Anderson and Richards, Scientific Monthly, 40: 187–192, fig. 6. 1942).



A schematic and idealized reconstruction of a small portion of an iridescent scale. On the right is a drawing of a cross section of one rib with its vanes and supports; one vane is drawn through a vertical mullion.
(From Anderson and Richards, in Jour. Applied Physics)

three-dimensional rendering showing the ribbed and perforated lower membrane from which rows of minute pillars rise and branch to support the bases of groups of fenestrated leaves which make up a single vane or ridge of a scale. Each of these fenestrated leaves is really an exceedingly thin sheet crossed by vertical and nearly horizontal thickenings or mullions. It is from these nearly horizontal thickenings, about 0.2 μ apart (= 0.0002 mm. or 0.000,008 inch), that the blue light is reflected and reinforced. An analogy has been drawn between this structure and a hypothetical transparent skyscraper. Light falling on the roof would be partly reflected, partly allowed to pass through. The same would happen at every floor. But only those rays with wave-lengths twice the height of a single floor would be reflected in phase so as to reinforce the rays from other floors. The reflection from any one floor would be relatively weak, but the sum of the reinforced reflections from 12–14 floors would be quite brilliant. The blue color of these scales is due to the spacings being half the wave-length of blue light; if the spacing were slightly greater the scales would appear green, if slightly less they would appear violet.

Examination of non-iridescent scales from the same wing showed that the non-iridescent scales have the same structure, *but* they have fewer reflecting mullions and these mullions are *too close together* to reflect and reinforce visible light. Also, among the iridescent scales, there are no structural differences between pigmented and non-pigmented scales—the pigment when present is below the vanes and merely makes a background for the overlying iridescent color.

The various optical effects shown by these scales can be explained on the basis of the structure shown in the figure but space will not permit enumerating them all (see papers cited).

Numerous miscellaneous observations were made. It may be coincidence but it seems remarkable that so many of the parts of the scale are traversed by thickenings approximately 0.2 μ apart —the vertical and horizontal mullions of the vanes, thickenings in the supporting rods and in the lower membrane. If this is not coincidence it would seem likely to represent a fundamental

periodicity of the chemical of which the scale is made. Another possibly molecular pattern comes from pictures showing a cloth-like fiber pattern in the vanes, the fiber being only 0.006 μ wide and 0.02 μ apart (0.000,000,24 and 0.000,000,8 inch respectively). If this represents anatomy, and there is no reason not to call it such, then it is indeed the smallest anatomy ever seen.

Correlated with the above remarks is the discovery that these butterfly scales, contrary to general assumption, are not chitinous. Chemical tests showed only protein, and while these tests are incomplete it seems likely that the architectural pattern may be a purely protein framework. A. G. RICHARDS, JR.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Anduze, P. J.—Estudios de entomologia medica en el Estado Merida (Venezuela). [46] 2: 149–60, ill. **Brandhorst, C. T.**—Study of the relationship existing between certain insects and some native West Kansas forbes and weedy plants. [65] 46: 164–75, ill. **Milne, A.**—The ecology of the sheep tick Ixodes ricinus. Distribution of the tick in relation to geology, soils and vegetation in north England. [116] 35: 186–96, ill. **Vogelsang & Gonzalez.**—Contribucion al estudio de la parasitologia ani-

mal en Venezuela. Gastrofilos de los equinos de Venezuela. [46] 2: 145–48. **Walker, H., Jr.**—Life histories and control tests on 3 insect pests of skins stored in the tannery. [103] 17: 7–14.

ANATOMY, PHYSIOLOGY, MEDICAL—Barltey & Mellanby.—The parasitology of human scabies (women and children). [116] 35: 207–09, ill. **Brecher & Wigglesworth.**—The transmission of Actinomyces rhodnii in Rhodnius prolixus and its influence on the growth of the host. [116] 35: 220–24. **Ephrussi & Herold.**—Studies of eye pigmentation of Drosophila. I. Methods of extraction and quantitative estimation of pigment components. [Genetics] 29: 148–175. **Denisova, S. M.**—Excretion of dyes from the body of Anopheles maculipennis by the excretory and phagocytic organs. [Zool. Jour., Moscow] 32: 259–62. (Russian, English Sum.) **Fyg, W.**—(See under Hymenoptera.) **Halberstaedter, Goldhaber & Hecht.**—The effect of x-rays on the development of insects. I. Irradiation in the larval stage. [Growth] 7: 413–26. **Harpster, H. A.**—The gaseous plastron as a respiratory mechanism in Stenelmis quadrimaculata (Dryopid). [Trans. Amer. Micr. Soc.] 63: 1–26. **Huffaker, C. B.**—The temperature relations of the immature stages of the malarial mosquito, Anopheles quadrimaculatus, with a comparison of the developmental power of constant and variable temperatures in insect metabolism. [7] 37: 1–27, ill. **Mellanby, K.**—The development of symptoms, parasitic infection and immunity in human scabies. [116] 35: 197–206, ill. **Walkden, H. H.**—(See under Coleoptera.)

ARACHNIDA AND MYRIOPODA—Bartley & Mellanby.—(See under Anatomy.) **Chamberlin, R. V.**—Chilopods in the collection of the Field Mus. Nat. Hist. [Field Mus. N. H.] Zool. Ser., 28: 175–216, ill. (*). **Keifer, H. H.**—Eriophyid studies XIV. [11] 33: 18–38, ill. (*). **Milne, A.**—(See under general.) **Pearse, A. S.**—Chelonethida from the Duke Forest. [129] 87: 36. **Radford, C. D.**—New parasitic mites from rodents. [116] 35: 161–66, ill.

THE SMALLER ORDERS—Banks, N.—Neuroptera of Northern S. Amer. [46] 2: 161–73 (*). **Gloyd, L. K.**—New sp. of Stypurus from Mexico. N. sp. of Archilestes from Mexico (Odonata). [114] 482 and 483: 4 and 4 pp., ill. **Mellanby, K.**—(See under Anatomy.) **Ross, E. S.**—Methodos de recoleccion, crianza y estudio de los Embiop-

teros. [105] 14: 441–46. **Tuthill, L. D.**—Descr. of some new N. Am. Psyllidae with notes on others. [103] 17: 1–6, ill. **Wygodzinsky, P.**—Note of the origin and classification of Apterygota. [105] 14: 516–21.

ORTHOPTERA—Giral, J., F. & M. L.—Sobre aceites de insectos. II. Melanoplus sp. [121] 4: 155–56. **Isely, F. B.**—Correlation between mandibular morphology and food specificity in grasshoppers. [7] 37: 47–67, ill. **Todd, A. C.**—On the development and hatching of eggs of Hammerschmidtiella diesingi and Leidynema appendiculatum, nematodes of roaches. [Trans. Amer. Micr. Soc.] 63: 54–67.

HEMIPTERA—Beamer, R. H.—N. sp. of Acinopterus from California. [103] 17: 21–22, ill. **Brecher & Wigglesworth.**—(See under physiology.) **Carvalho & Drake.**—Neotropical Miridae: Concerning the Pennington Collection. [105] 14: 522–24 (*). **DeLong, D. M.**—A n. sps. of Plummerella from Mexico. [7] 37: 68–69, ill. **Drake & Hambleton.**—Concerning Neotropical Tingitidae. [91] 34: 120–29 (*S). **Knull, D. J.**—Nomenclatorial notes on Cicadellidae. [7] 37: 123. **McKenzie, H. L.**—Miscellaneous Diaspid scale studies (Coccoid). [11] 33: 53–59, ill. (*). **Wygodzinsky, P.**—Notas sobre as esp. brasileiras do gen. Aradus. [105] 14: 502–10, ill. (*).

LEPIDOPTERA—Decker, G. C.—Annotated list of the Crambid moths known to occur in Iowa (Pyral). [Proc. Iowa Acad. Sci.] 50: 337–39. **Miller, D. O.**—Observations on soil webworms (Crambus sp.) in Kansas. [65] 43: 267–82, ill. **Stallings & Turner.**—Notes on Lepidoptera. [103] 17: 29–31.

DIPTERA—Alexander, C. P.—New or little known Tipulidae from Venezuela. II. [46] 2: 125–44, ill. Records and descr. of Tipulidae from tropical Amer. IV. [105] 14: 485–502 (*). **Boesel & Snyder.**—Observations on the early stages and life history of the grass punky, Atrichopogon levis. [7] 37: 37, ill. (K). **Carrera, M.**—Algumas notas sobre Scenopinus. [105] 14: 524–25. **Hardy, D. E.**—Rev. of N. Amer. Omphralidae (Scenopinidae). [103] 17: 31–40 (cont.) (K*). **Huffaker, C. B.**—(See under Anatomy.) **Hull, F. M.**—Some Neotropical Syrphids. [105] 14: 510–15 (*). **Jones, D. T.**—Rare variant of Pollenia rudis, the Iowa winter house fly. [Proc.

Iowa Acad. Sci.] 50: 345–46, ill. **Lane, J.**—Geographic distribution of Sabethini (Culic). [105] 14: 409–29, ill. **Lane e Vulcano.**—A armadura bucal dos Simuliideos e seu valor taxonomico (Simuli). [105] 14: 430–40, ill. **Lane e Whitman.**—Nov. esp. de Culex do Brasil. [105] 14: 389–408. **Roth, L. M.**—Key to the Anopheles of the Southeastern U. S., by male genitalia. [119] 31: 96–110, ill. **Roth & Young.**—Culex atratus in Florida. [7] 37: 84–88, ill. (K).

COLEOPTERA—Blackwelder, R. E.—Checklist of the coleopterous insects of Mexico, Cen. Amer., W. Indies and S. Amer., I. [Bull. U. S. Nat. Mus.] 185: 188 pp. **Bondar, G.**—Notas entomologicas da Baia. XIII. Rev. e fusao dos gen. Celetes, Everges, Hoplorhinus, Erirrhinoides, Phytotribus, Centemerus, Ancylorrhynus (Erirrhininae); Barinae em palmeiras &c.; Novo Himatidium &c. [105] 14: 337–88, ill. (*). **Cartwright, O. L.**—New Scarabaeidae from United States. [7] 37: 28–36, ill. **Fattig, P. W.**—Phyllophaga or may beetles of Georgia (Scarabae). [Emory Univ. Mus. Bull.] 2: 31 pp. **Harpster, H. A.**—(See under physiology.) **Knull, J. N.**—Notes on Agrilus with descr. of two n. sps. [7] 37: 75–83, ill. **Marshall, G. A. K.**—On the gen. of the tribe Cyphicerini (Curcul). [75] 11: 73–98 (k). **Owen & Jaques.**—Preliminary list of the Elateridae of Iowa. [Proc. Iowa Acad. Sci.] 50: 341–44. **Sanderson, M. W.**—Distribution and hosts of Arkansas Phyllophaga (Scarab). [103] 17: 14–21. **Walkden, H. H.**—Seasonal variation in resistance to high temperature of the cadelle and the confused flour beetle. [65] 43: 283–88, ill.

HYMENOPTERA—Bugbee, R. E.—Two n. sps. of the Laxitas complex from Mexico (Eurytom). [103] 17: 23–29, ill. **DeBach, P.**—Environmental contamination by an insect parasite and the effect of host selection. [7] 37: 70–74. **Fyg, W.**—Experimentelle Untersuchungen ueber den Eilegeakt der Bienenkoenigin. [Mitt. Schweizer. Ent. Gesells.] 18: 493–521, ill. **Michener, C. D.**—Comparative external morphology, phylogeny and a classification of the bees. [62] 82: 157–326, ill. **Moure, J.**—Notas sobre abelhas da colecao Zikan (Apoidea). [105] 14: 447–84 (S*). **Weber, N. A.**—The neotropical coccid-tending ants of the genus Acropyga. [7] 37: 89–122, ill. (k*).

SPECIAL—Mosquito News, vol. 4, no. 1. Pub. by the Eastern Assoc. Mosquito Control Workers.

LIST OF JOURNALS CITED

7.—Ann. Entom. Soc. America. 11.—Bull. Dept. Agric., Calif. 46.—Bol. Entom. Venezolana. 62.—Bull. Amer. Mus. Nat. Hist. 65.—Trans. Kansas Acad. Sci. 75.—Annals and Mag. Nat. Hist. 91.—Jour. Washington Acad. Sci. 103.—Jour. Kansas Entom. Soc. 105.—Rev. Entomol. R. d. Janeiro. 114.—Occ. Pap. Mus. Zool. Univ. Mich. 116.—Parasitology, London. 119.—Amer. Midland Nat. 121.—Ciencia, Mexico. 129.—Anatomical Record.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

Lampyridae of U. S. and Canada wanted from the South and West, especially Photinus and Pyractomena for revisional study. Buy or exchange. J. W. Green, R. D. 2, Easton, Pa.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

A CATALOGUE AND RECLASSIFICATION OF THE NEARCTIC ICHNEUMONIDAE

(HYMENOPTERA)

By HENRY K. TOWNES, JR.

(Memoirs of the American Entomological Society, Number 11)

The parasitic habits of this group of insects render them of great economic importance and biological interest, but because of the handicaps of an extremely scattered literature and confused taxonomy, a vast amount of preparation is required of the prospective worker, if his results are to be of lasting value.

This catalogue is a coherent guide to the published information and thereby opens the field to more and a better class of research. It gives a more natural systematic arrangement than has previously been available, a bibliography, and a list of the host and parasites of the described ichneumon-flies which occur in America north of Mexico, complete through the year 1940.

The catalogue will be published in two parts (to facilitate publication in the present paper situation), the first covering the subfamilies Ichneumoninae, Tryphoninae, Cryptinae, Phaeogeninae and Lissonotinae, and will comprise 477 pages. The second part will contain the remaining subfamilies, an alphabetic list of unplaced genera and species, and of nomina nuda, a systematic list of hosts and parasites, an index to hosts and parasites, and an index to the genera and species in the entire work, and will cover about 450 pages.

The price of the entire work, parts I and II (in paper cover), is $15.00, post paid, if remittance accompanies order. An alternative price is $10.00 on delivery of part I and $8.00 on receipt of part II.

Part I will be ready for delivery in August, 1944 (unforeseen delays excepted). Part II is in press and should be ready for delivery the latter part of the present year (1944).

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.